

PATENT COOPERATION TREATY

PCT



INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 31 JAN 2006

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Applicant's or agent's file reference WNMSR/FRHIT.003	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/GB2005/000724	International filing date (day/month/year) 28.02.2005	Priority date (day/month/year) 26.02.2004	
International Patent Classification (IPC) or national classification and IPC B64D37/32, A62C3/06			
Applicant FR-HITEMP LIMITED ET AL			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input checked="" type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 19.09.2005		Date of completion of this report 01.02.2006	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Calvo De No, R Telephone No. +31 70 340-3113 	

**INTERNATIONAL PRELIMINARY REPORT
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Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-6 as originally filed

Claims, Numbers

1-8 received on 23.11.2005 with letter of 22.11.2005

Drawings, Sheets

1/1 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

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Box No. IV Lack of unity of invention

1. ☐ In response to the invitation to restrict or pay additional fees, the applicant has:
- ☐ restricted the claims.
 - ☐ paid additional fees.
 - ☐ paid additional fees under protest.
 - ☐ neither restricted nor paid additional fees.
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with.
 - ☒ not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- ☐ all parts.
 - ☒ the parts relating to claims Nos. 1-5,8 .

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-5,8
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-5,8
Industrial applicability (IA)	Yes: Claims	1-5,8
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item IV

Lack of unity of invention

Reference is made to the following document:

D1: WO 00/00389 A (L'AIR LIQUIDE, SOCIETE ANONYME POUR L'ETUDE ET, L'EXPLOITATION DES PRO) 6 January 2000 (2000-01-06)

This Authority considers that there are two inventions covered by the claims indicated as follows:

- I: Claims 1-5 and 8 directed to a system and method for providing nitrogen-enriched air to an aircraft fuel tank so as to inert it while maintaining the pressure difference across the walls of the fuel tank below a design threshold.
- II: Claims 6 and 7 directed to a system for providing-nitrogen enriched air into several of a plurality of interconnected bays of an aircraft fuel tank

The reasons for which the inventions are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT, are as follows:

The prior art has been identified as document D1 and discloses (the references in parentheses applying to this document):

An aircraft fuel tank system and inerting method wherein there are provided:
at least one aircraft fuel tank;
an air separation means for producing nitrogen-enriched air, and control means operable to control said air separation means to supply nitrogen-enriched air into said at least one aircraft fuel tank during cruise conditions and to supply nitrogen-enriched air at a higher flow rate during descent (see p.2, lines 7-16 and p. 4, lines 1-11), whereby a mass of gas is provided by said air separation means to maintain the pressure difference across the walls of the fuel tank below a design threshold (see p.2, lines 10-13).

It follows that the following technical features of claims 1 and 8 make a contribution over the prior art and can be considered as a special technical feature within the meaning of

Rule 13.2 PCT:

That said air separation means provides the whole of the mass of gas necessary to maintain the mass of gas necessary to maintain the pressure difference across the walls of the fuel tank below the design threshold.

The problem solved by this special technical feature can therefore be construed as avoiding a local concentration of oxygen in the fuel tank due to the inrush of ambient air.

On the other hand, the following technical features of claim 6 also make a contribution over the prior art and can be considered as a special technical feature within the meaning of Rule 13.2 PCT:

The at least one aircraft fuel tank having a plurality of interconnected bays, wherein the means for delivering nitrogen enriched air are suitable for delivering it to a plurality of said bays.

The problem solved by this technical feature can therefore be construed as that of inerting a fuel tank which is subdivided into a plurality of bays.

Also, examining the possible correspondence by technical effect, one finds that the technical effect of the first invention is that only nitrogen-enriched air fills the tank ullage space and that the technical effect of the second invention is that several of the plurality of bays of the tank are provided with nitrogen-enriched air.

This appears to show lack of corresponding technical effect as well. Consequently, neither the objective problem underlying the subjects of the claimed inventions, nor their solutions defined by the special technical features allow for a relationship to be established between the said inventions, which involves a single general inventive concept.

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

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The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-5 and 8 does not involve an inventive step in the sense of Article 33(3) PCT.

As seen in the discussion of Item III, the problem to be solved by the present invention may be regarded as that of avoiding a local concentration of oxygen in the tank ullage due to ambient air inrush.

The solution proposed in claim 1 of the present application however cannot be considered as involving an inventive step (Article 33(3) PCT) since in D1 it was already suggested to increase the rate of nitrogen-enriched air flow to minimise the inrush of ambient air (see p. 2, lines 10-13). It therefore appears that it would have been obvious for the skilled person to further increase the NEA flow so as to eliminate the ambient air inrush altogether.

The same reasoning applies, *mutatis mutandis*, to the subject-matter of the corresponding independent claim 8, which therefore is also considered not inventive.

Dependent claims 2-5 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step, see document D1 and the corresponding passages cited in the search report.

ClaimsEPO - DG 1
28. 11. 2005

(55)

1. An aircraft fuel tank system comprising:

at least one aircraft fuel tank;

an air separation means for producing nitrogen-enriched air, and

5 control means operable to control said air separation means to supply nitrogen-enriched air into said at least one aircraft fuel tank during cruise conditions and to supply nitrogen-enriched air at a higher flow rate during descent, whereby the whole of the mass of gas required to maintain the pressure difference across the walls of the fuel tank below a design threshold is provided by said air separation
10 means.

2. An aircraft fuel tank system as claimed in Claim 1, wherein said control means controls the air separation means such that the whole of the mass of gas required to maintain said pressure difference is provided by said air separation device.

15 3. An aircraft fuel tank system as claimed in Claim 1 and Claim 2, wherein said air separation means in use provides nitrogen-enriched air having a relatively high concentration of nitrogen at relatively low mass flow rates, with the concentration of nitrogen being lower at higher mass flow rates.

4. An aircraft fuel tank system as claimed in any of the preceding Claims,
20 including means for distributing the nitrogen-enriched air at a number of spaced locations in said at least one aircraft fuel tank, thereby in use to reduce variations in concentration of nitrogen within said tank.

5. An aircraft fuel tank system as claimed in any of the preceding Claims, wherein said air separation means comprises a Hollow Fibre Membrane.

6. An aircraft fuel tank system comprising:

at least one aircraft fuel tank having a plurality of interconnected bays;

means for providing nitrogen-enriched air for delivery into said at least

5 one tank, and

means for delivering said nitrogen-enriched air into a plurality of said
bays.

7. An aircraft fuel system as claimed in Claim 6, wherein said substantially
the entire amount of nitrogen-enriched air is drawn from said providing means.

10 8. A method of inerting at least one aircraft fuel tank which comprises
operating an air separation device during cruise conditions to deliver nitrogen-
enriched air with a relatively high concentration of nitrogen at a relatively low
mass flow rate into said aircraft fuel tank, and operating said air separation
device during descent conditions to deliver nitrogen-enriched air with a lower
15 concentration of nitrogen and at a relatively high mass flow rate, whereby the
air-separation device provides the whole of the mass of gas required to maintain
the pressure difference across the walls of the or each fuel tank below a design
threshold.